

GRAIL 2.0 USER GUIDE

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CHAPTER 1

Overview

The Idaho Transportation Department (ITD) has as its biggest asset a large, state wide transportation infrastructure. But perhaps ITD's second biggest asset is information about that infrastructure. Historically, this information has been partitioned off into little islands of data files in various locations across the department. For example, pavement management data was typically to found in a very different location from railroad crossing data which would be in yet another location from bridge sufficiency data. As ITD moves toward a client/server way of doing business the need for ITD to have all its public data accessible from anywhere within the department is being addressed. But now that a wide variety of data is becoming available, would it not be valuable to have an automated tool that would allow engineering and other interested personnel within (and outside of) ITD to compose quick, visually appealing reports that can display this wide variety of data concurrently? For this reason GRAIL was born. GRAIL stands for Geographic Roadway Application for Information Location. Granted, the acronym was a bit contrived to fit the word "GRAIL", but the acronym is indicative of the software application's purpose. GRAIL is a Microsoft Windows 95/98/NT/2000 application that is designed to access ITD's database across the network, but also works on copies of flat files located on the user's hard drive, network drive, or CD-ROM. The software allows the user to view data elements along state highways. In addition, it provides a map (with optional hydrography, minor road, and elevation layers). GRAIL can also produce simple text-based output of user-selectable data items. GRAIL is purely a roadway-based application, while ITD has investments in other modes of transportation, GRAIL just focuses on highways. GRAIL is not a Geographic Information System (GIS). It is not designed to calculate land areas or identify impact zones or relate road attributes based on their distances from other things. The map is strictly to provide the user some visual context for the road of interest.

GRAIL is...

- A utility for at-a-glance assessment of highway information
- A program that produces text-based output of user-selectable data items
- Able to leverage the department's client/server investment
- An internet aware application for keeping its data current

GRAIL is not...

- A GIS application (no land area calculations, no "what if" analyses)
- A detailed mapping package
- A data analysis tool (no statistics on the data)
- A data editing package
- An end to all your problems

In summation, the basic idea behind GRAIL is to present highway data as clearly and as rapidly as possible (without having to wait on the Planning Division). The user is shown the data elements displayed as bar charts that correspond to a map on the top of the display. Besides viewing data on the screen, GRAIL will be able to produce text reports based on these data.

CHAPTER 2

Getting Started

SYSTEM REQUIREMENTS FOR GRAIL

Depending on how GRAIL is installed, the system requirements may vary. But at a minimum the system needs to have a Pentium or better CPU (200 MHz+ strongly recommended) and at least 32 megabytes of RAM with 64+ strongly recommended. A mouse or equivalent is necessary. VGA graphics with at least 640 x 480 resolution is required (with 1024 x 768 or higher recommended). A CD-ROM drive (24x or faster recommended) or at least 400 megabytes of free hard drive space. An active (and speedy) Internet connection is strongly recommended.

INSTALLING GRAIL

Unlike many commercial software titles, GRAIL does **not** use a prepackaged program (like InstallShield™) to install the software. Therefore, the chores that would normally be accomplished automatically (or with extensive prompting) by an installation program need to be handled manually by the user (but they are all really easy).

There is a really easy way to get everything needed to run GRAIL on the hard drive. All that needs to be done is the “grail” directory from the CD or network gets copied to the “Program Files” directory.

The really easy way to install GRAIL is to have a CD or network copy of the software and to copy the “grail” directory structure to the user’s hard drive (in the “Program Files” directory, for example). The following diagram illustrates a simple and logical directory structure for GRAIL and all its files.



However, this is not the *only* way GRAIL can be installed. The subdirectories (“bem”, “kangaroo”, and “marplot”) can actually be named anything and live anywhere as long as their contents are intact. A likely reason why the user might have the subdirectories live elsewhere is if there is already another program installed that uses them (like, SMAUG or DRAGON). In which case, GRAIL can be told where to find these directories (and that issue will be discussed in the next section).

Finally, if the user so chooses, he/she can build a Windows™ shortcut to the executable file to be placed on the desktop or in the Start Menu.

MAKING SURE GRAIL FINDS EVERYTHING

Once the program files are installed. The user can click the icon that represents the executable file (or its shortcut) to run the program. At start time, GRAIL is equipped with a mechanism that detects whether it can find its mapping (“bem” and “marplot”) files. If GRAIL cannot find these, it will present a dialog box that will allow the user to tell GRAIL where to find these directories. If the location of these files changes while the program is running, GRAIL will need to be restarted in order to re-locate the mapping directories. (The technically inclined user is welcome to visit Chapter 8 under the section ‘The Silly Little “INI” Files’ to understand how GRAIL and certain other software locates its mapping data.)

The highway data is the other key element GRAIL must find. The default setup is that GRAIL will look for most of the highway data on the ITD server accessed via the Internet. The data not sought for over the Internet will be searched for in the directory specified in the “Change Flat-File Directory” option under the “Data Sources” menu. If GRAIL is unsuccessful in finding a data item that is trying to be displayed, GRAIL will make it painfully obvious. The information as to whether GRAIL will search the Internet or in the flat-file directory is stored in the data specifications file -- a topic that is discussed elsewhere in this document.

GETTING AROUND IN GRAIL

Grail has two primary modes. The first is “Map Search Mode”, which the program starts in. It is used primarily for navigation. The other, which is referred to as the “Main View Mode”, is used for examining the data. Toggling between the two can be achieved by pressing the “Map Search” button in the toolbar or by clicking the similar item in the “View” submenu. Pressing ‘Esc’ key or double-clicking on a road also switches from the Map Search Mode to the main view.

If the program seems unresponsive or recalcitrant, look in the status bar. The bar at the bottom edge of the program often changes to reflect the item being currently pointed to by the mouse, and sometimes describes the consequences of clicking on the item. Reading the information displayed there should make the program’s expectations clear.

When in doubt, double-click. To prevent Grail from taking time-consuming actions due to accidental mouse-clicks, it often responds to double, rather than single-clicking. The technical term for this double-clicking is called “clicking with feeling”.

Pressing and holding down the [Shift] key will cause **any** map to act as a navigation tool, taking the user to the point on the nearest road when double-clicked upon. This can be used to go to nearby roads in the main view or to circumvent the Map Search’s district-county-road navigation scheme.

Right-clicking in **any** part of GRAIL's main window (that is, not on Windows™ menu bars, dialog boxes, titles, and the like) brings up the Property Box for the program, through which a variety of settings can be changed applying to various parts of the program. GRAIL sometimes also ventures a guess as to which property page was desired, but the user can of course select the desired page once there.

In the Main View Mode, many of the textual informational readouts in the Data Bar Box are responsive to left-button mouse clicks. When clicked upon, they offer an opportunity to change the described value. This is often the most direct way to modify the value.

In the Main View Mode, Grail responds to many of the arrow and navigation keys. These are detailed in the "Using GRAIL as a Lookup Tool" section of this document. Note that the keyboard [+] and [-] keys are used to change the zoom level; they do not require the simultaneous depression of the [Shift] key to work properly (though it doesn't hurt).

CHAPTER 3

Data, Data, Data...

WHAT KIND OF HIGHWAY DATA GRAIL CAN USE

GRAIL is designed to view any highway data that is keyed by MACS Segment Code and Milepost. This segment code and milepost method of location reference is presently the standard way to locate highway information at the Idaho Transportation Department. A segment code is essentially a serial number or a unique identification number for a section of highway. The beginning and ending mileposts refine the location of the record to a specific piece of the highway segment. The beginning and ending mileposts can be the same value. Such would represent a point on the highway segment. Though GRAIL has a great deal of flexibility reading a variety of flat file formats, certain file formats are easier for the user to get GRAIL to read than others. Specifically, a flat file formatted as follows is the easiest layout for the user to describe to GRAIL:

Column Numbers	Information
1 – 6	The six digit MACS segment code
7 – 12	The beginning milepost in thousandths of a mile
13 – 18	The ending milepost in thousandths of a mile
20 +	The actual highway data

The last row of this table likely raises a couple of issues: 1) What is encompassed in the term “highway data”? and 2) Don’t we have to specify the format of the “highway data” somewhere?

The answer to the first question reveals the data storage philosophy that GRAIL reflects. “Highway data”, sometimes referred to as “highway attribute data”, is generally stored one data item per file. An exception is that it would be appropriate to store multiple data items that are very similar (like right shoulder width and left shoulder width) in a single file. So when this document refers to a file of “highway data”, it is usually meant to represent a single attribute of a highway as it spans the mileages (or points) described in the file’s records.

THE TEMPORAL ASPECT OF HIGHWAY DATA

One problem with a file highway data is that in and of itself, one might not know what time period the data applies to. A remedy for this would be to go to the GRAIL web site and download a fresh set of the data for viewing. But such can be time-consuming and possibly not necessary. There might be certain data items where the user doesn’t care about which dates the data applies to, and GRAIL can support this. But GRAIL can be told to select between multiple flat files containing the same highway data based on the

date the user selects. The “effective date” is the date the data begins to apply and the “expiration date” is the date the data stops applying.

If using a flat file, the dates for which the data is relevant need to be specified in the data specification file. As such, the effective and expiration dates apply to all records in the given file. If using a database table to describe the highway data, the date for which the data is applicable is coded on a record by record basis.

SOURCES OF FRESH (and Not So Fresh) HIGHWAY DATA

The GRAIL Web Site has links to flat file data sources and the name of the current public Planning Services Highway data (Highway Data Quest) database. The database will be kept current with the latest data.

THE DATA SPECIFICATION FILE

The way GRAIL knows where its data is located is the “Data Specification File”. Its name is “dataspec.txt”. The file is equipped with a reasonable set of data items mostly being drawn from the public database. GRAIL, however, can be configured to show just about any data that is keyed with MACS Segment Code and Milepost (which is common within the Idaho Transportation Department); that Data Specification File is where such changes are. Chapter 8 gives specifics as to how to modify the file if necessary.

CHAPTER 4

Customizing GRAIL

USING THE PROPERTIES BOXES

The various visual components of GRAIL can have certain aspects of their appearances altered through the use of the “properties boxes”. These “properties boxes” are essentially a tabbed group of dialog boxes that allow the user to set options that affect the display of the different parts of GRAIL. Presently there are four properties boxes: One for the “map search” map, one for the map located at the top of the typical GRAIL display, one for the data bar box, and one for the “appearances” – which denotes how a data bar shows the data it represents. Each properties box has options that are specific to the part of GRAIL each is intended to modify. To bring up a properties box for a given part of the GRAIL display, the user can right-click on the appropriate part of the display. This will bring up the properties boxes with what GRAIL thinks is the appropriate tab selected. The user can at any time choose a different tab to alter the properties of the other parts of GRAIL. So, for example, if the user wants to make sure that elevation data is shown on both types of maps (the regular map and the “map search” map), the user doesn’t have to go to each type of map and then bring up its appropriate properties box. The user can just from either location modify the properties for each type of map by selecting the appropriate tabs and then making sure the “Digital Elevation Model” checkbox for each is checked. The “Edit Data Bar Contents” tab of the properties box is the way the user selects which data items are show in the data bar box. The “Edit Appearance Property Page” tab allows the user to tell GRAIL what each data bar looks like.

WHAT ARE APPEARANCES ANYWAY? (AND HOW TO CHANGE THEM)

As alluded to earlier, an “appearance” is the way for a user to tell GRAIL *how* to display the data referenced by a data bar. It is essentially a set of instructions that specify how various values of a data item are to be displayed. To get a data bar to represent a data item consists of two steps. The first step is to create an appearance, and the second step is to assign the appearance to the data bar. Fortunately, when GRAIL starts up, it sees what data items it needs to display by default. Then it looks for appearances that are already known to GRAIL and assigns the appropriate appearances to the appropriate data bars. If GRAIL doesn’t have an appearance for a given data bar in its repertoire, it will automatically size up the data ranges and create its own appearance automatically. Though the resulting data bar may look a little garish, it does have the outstanding benefit that the user doesn’t have to worry about creating and assigning appearances if the user really doesn’t want to or care to. Of course, the user can decide at any point to change any of the appearances if he or she is so inclined. The “Edit Appearance Property Page” tab of the properties box is where the user would go to create an appearance. The “Edit

Data Bar Contents” tab of the properties box is where the user would go to assign this newly created appearance to a data bar. The user can also automatically create an appearance for a given data bar by clicking on the “Modify the selected bar” button and selecting the “Auto-create a new Appearance from Data Source information” radio button and clicking “OK”.

CHAPTER 5

Using GMAIL as a Lookup Tool

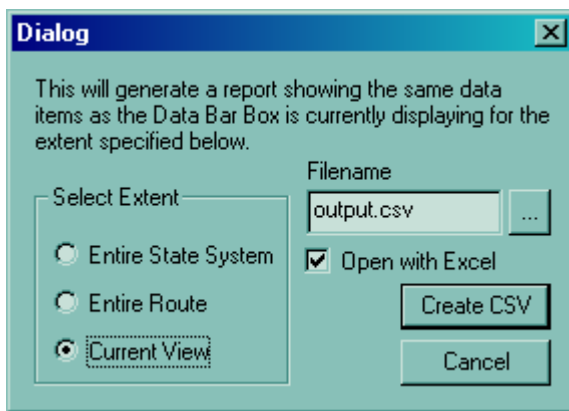
It is envisaged that GMAIL's main use will be as a highway attribute data lookup tool. Instead of having to research every little piece of highway data, GMAIL could be at the ready on the desktop dutifully answering questions about data on portions of the state highway system. GMAIL can be configured to default to a certain set of data that is displayed in the data bar box. That way, a user with a specific interest would be able to concentrate on just the data items of interest.

CHAPTER 6

Using GRAIL as a Reporting Tool

Besides being an interactive highway attribute data lookup tool, GRAIL is also a data reporting tool. By specifying which data items are displayed in the data bar box, the user can specify the data items that can be placed in a text report. By default, the report is generated in a comma separated values (CSV) format, and GRAIL offers the user the option to open the CSV file in Microsoft TM ExcelTM.

GRAIL's reporting tool is enabled by clicking on the "Report" menu. Upon clicking, the user is presented with the following dialog box:

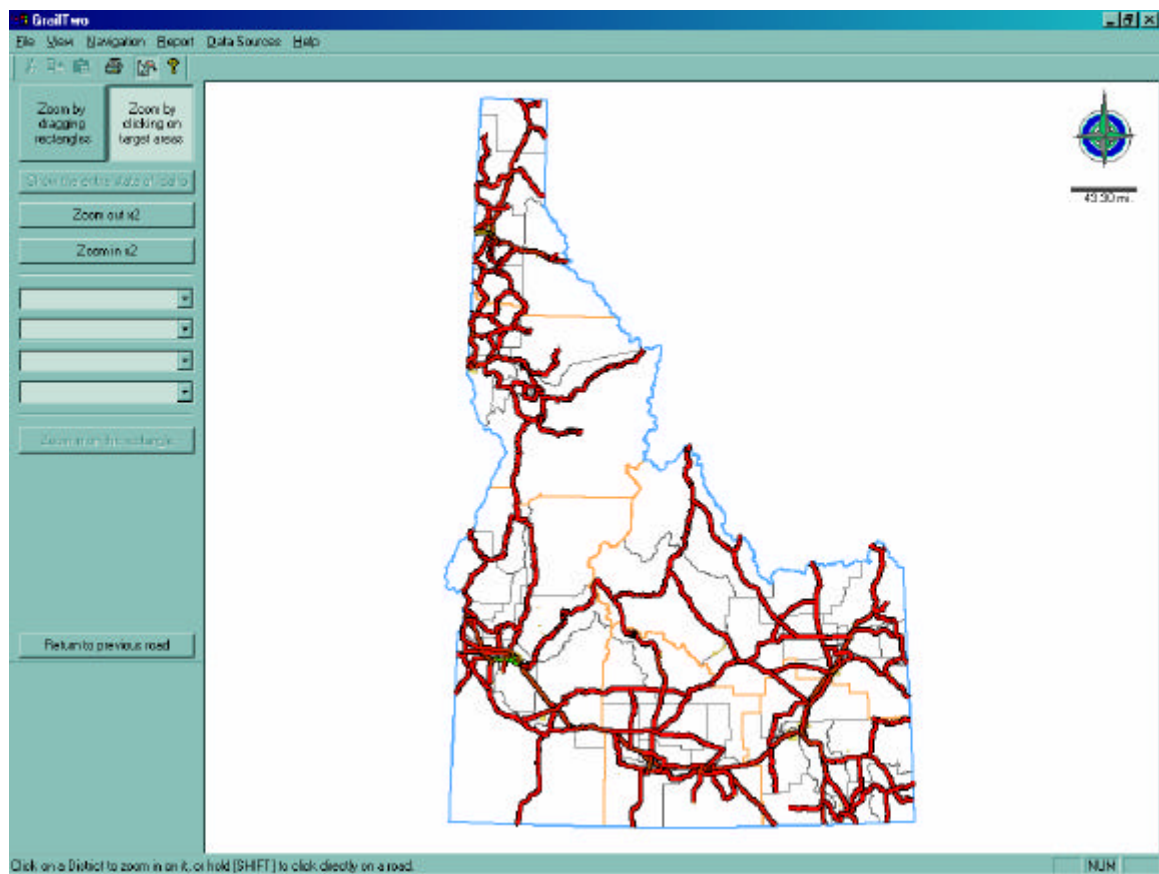


The left side of the dialog lets the user specify where on the state highway system the report applies. "Current View", which is the default, builds the report based on whatever sections of highway were being viewed at the time the user clicked on the "Report" menu.

CHAPTER 7

GRAIL's Windows and Dialogs

The Map Search Screen:



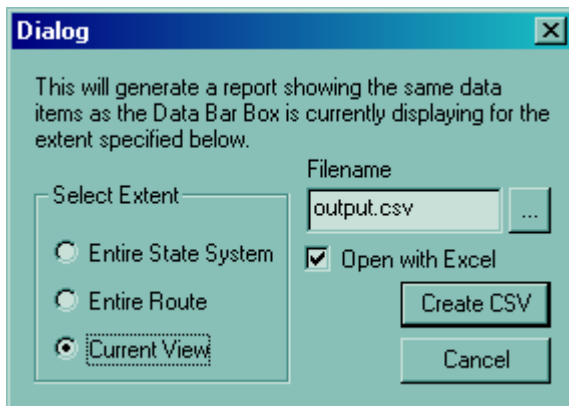
When you run GRAIL, this is the screen that the program starts with. It is the “Map Search” screen. Its job is to allow the user to locate where in the state he/she wishes to view highway data. In the upper left there are two zoom mode buttons. The left one allows the user to zoom by dragging rectangles that can subsequently be zoomed in on. The right button (which is the default) allows for the highlighting of districts as the mouse passes over them. If the user clicks on a district (or zooms in with a rectangle), the “Zoom by clicking on target areas” button allows the highlighting of roads, cities, and counties as the mouse passes over these.

The wide button immediately below the two zoom mode buttons allows the user to return to the whole state view. The button below that allows the user to zoom out by a factor of 2. So if the screen's width happened to show 100 miles across, pushing the "Zoom out x2" will result in the screen's width showing 200 miles. Correspondingly, the button below that zooms in by a factor of 2.

Below these buttons are four dropdown list selector tools. These allow the user to zap to a specific district, county, city, or route directly.

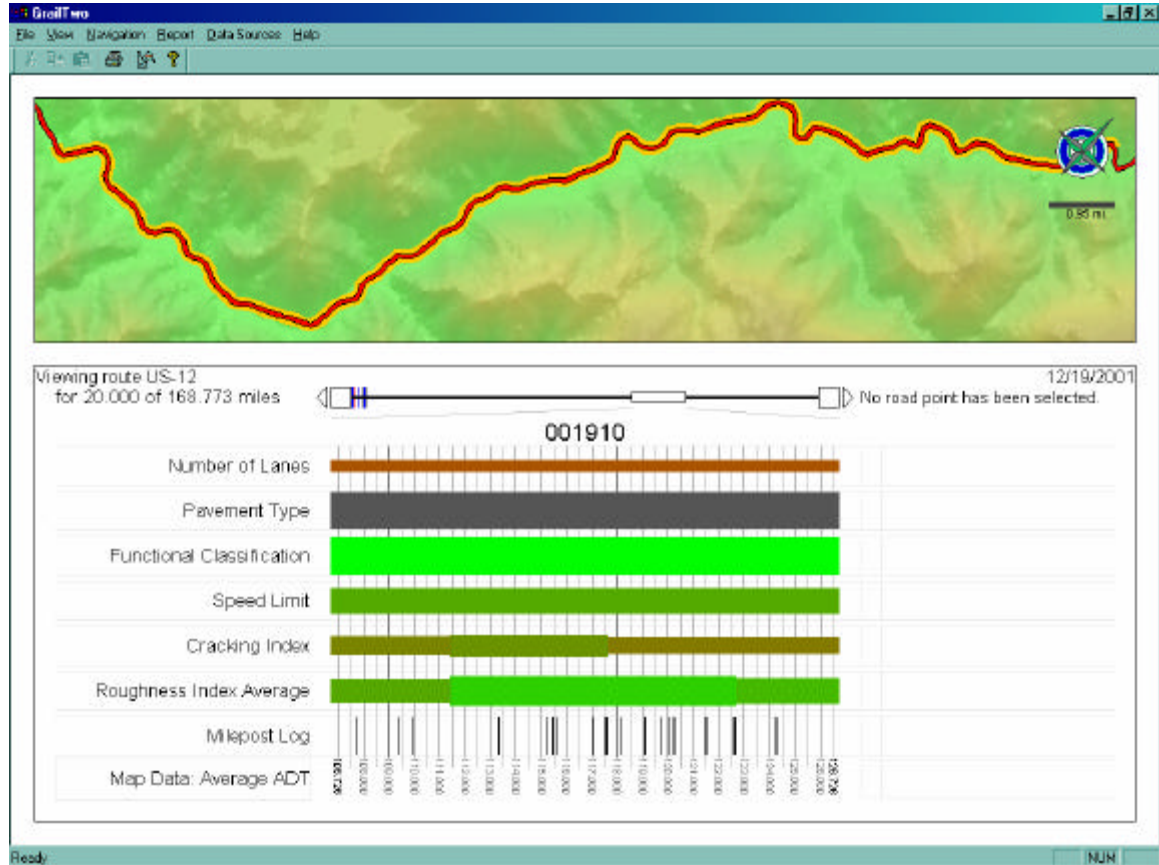
Below those tools is the "Zoom in on the rectangle" button which is only active if the user has dragged out a rectangle (when the "Zoom by dragging rectangles" button is selected).

The Text Report Dialog:



This dialog is invoked by clicking on the "Report" menu item. It allows the user to create a comma separated values (CSV) report of the data in the current view of GRAIL. The radio buttons on the left allow the user to select the entire state system, the entire route, or just the piece of the route currently being viewed on the screen. The "Filename" field allows the user to specify the name of the text file to which the data will be written. Its default is "output.csv" and it will be written in the current working directory from which GRAIL is executed. The checkbox immediately below the "Filename" field gives the user the option to open the newly created file in Microsoft TM Excel if such is installed on the computer already. The "Create CSV" button actually tells GRAIL to make the file and could very easily have been named "Ok". The "Cancel" button cancels the CSV report operation.

The Main GRAIL Window:



This is the main view that is used to view data along state highway sections. It is divided into two logical parts: 1) the map, and 2) the data bar box.

The map shows the portion of state highway that is being described by the data bar box below. The exact mileage of road being so described is highlighted with the highlight color, which in this case is orange. Depending on the map display properties, the user can see varying levels of detail in the background of the map. In the case illustrated above, the mapplot places (which are cities and counties – note the yellow city near the lower left corner of the map), the digital elevation model (which is the colorful relief in the background), the compass rose/north arrow (to indicate which way north is), and the distance scale (which shows how many miles are represented by the horizontal line above the mileage). The map display properties can be modified by bringing up “*The Map Properties Dialog*” which is done by right mouse clicking on the map.

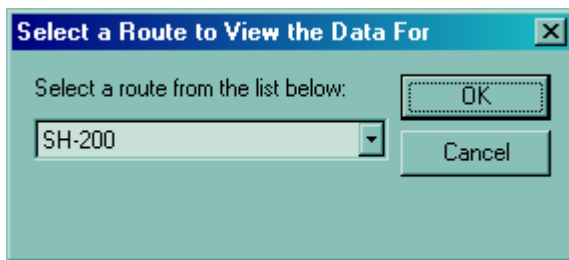
Besides just illustrating graphically the layout of the road and its environs, the map also allows the user to navigate to other state highways that may be visible on the current map. In the above example, near the left side of the map there is another faintly visible state highway. The user can hold the [Shift] key down and mouse over to that highway. The status bar at the bottom of the window (the thing that presently says “Ready”) will give the user facts about the other road under the mouse cursor. A ghostly white light

identifies the point on the other highway that is being pointed to by the mouse when the [Shift] key is held down. When the user double clicks the mouse on a given point on the other highway (while the [Shift] key is still held down), GRAIL will jump to that portion of the state highway system.

The data bar box is where the user can find detailed information about the state highway being examined. The data bar box is composed of (as the reader might suspect) horizontal data bars, each of which describing a specific data item. The data items represented by the bars, the number of bars, and their appearances can all be modified by right clicking on the data bars. Also, pressing the [+] key or the [-] key will zoom in or out on the highway being considered.

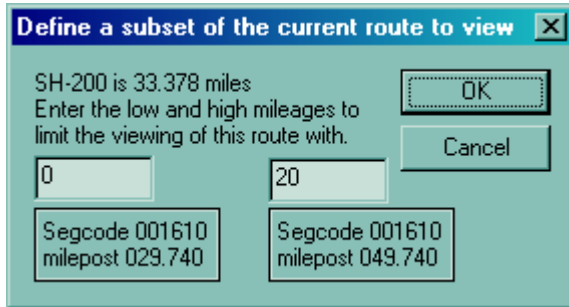
Finally, the user can change the proportions of the space consumed by the map and the data bar box by mouse dragging on the gap between the map and the data bar box up and down.

The Route Selection Dialog:



This dialog box allows the user to select what route they want to jump to in GRAIL. The user is taken to the first 20 miles of the selected route. This dialog is usually invoked by clicking on the line that says something like "Viewing Route SH-200" in the data bar box.

The Mileage Range To View Along A Route Selection Dialog:



Define a subset of the current route to view

SH-200 is 33.378 miles
Enter the low and high mileages to limit the viewing of this route with.

0 20

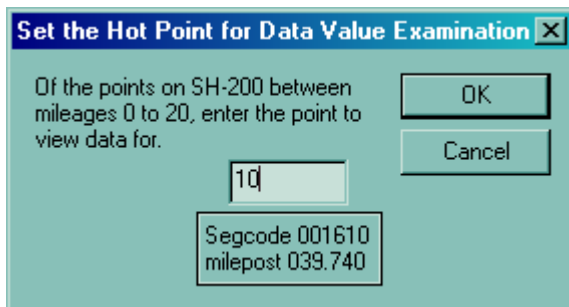
Segcode 001610
milepost 029.740

Segcode 001610
milepost 049.740

OK Cancel

This dialog box lets the user select what portion of a state highway to view in GRAIL. This could be thought of as a zoom control as the user can just type “0” in the low mileage limit and the length of the route (which is displayed above) in the high mileage limit to see the whole route or type in two mileages that are very close to each other to zoom in to a small section of the route. The mileages entered are not to be confused with the official mileposts of the actual segments that constitute the route as specified in the MACS (Milepost And Coded Segment) System. These mileages that are entered are simply the number of miles along a route from its beginning. So a given route may start at milepost 100 and go to milepost 121.5 (with no milepost equations). Yet, the mileages that one could enter into this dialog box would range from 0 to 21.5 since there are only 21.5 miles in this route. This dialog box is typically invoked by clicking on the text that says something like “for 20.000 of 33.378 miles” in the upper left portion of the data bar box.

The Hot Point Location Selection Dialog:



Set the Hot Point for Data Value Examination

Of the points on SH-200 between mileages 0 to 20, enter the point to view data for.

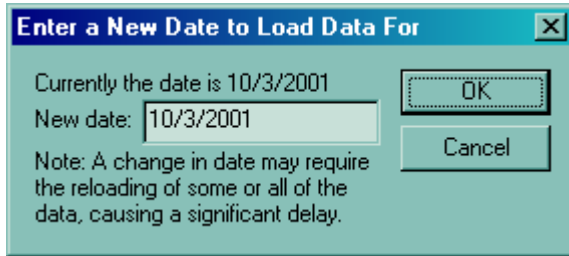
10

Segcode 001610
milepost 039.740

OK Cancel

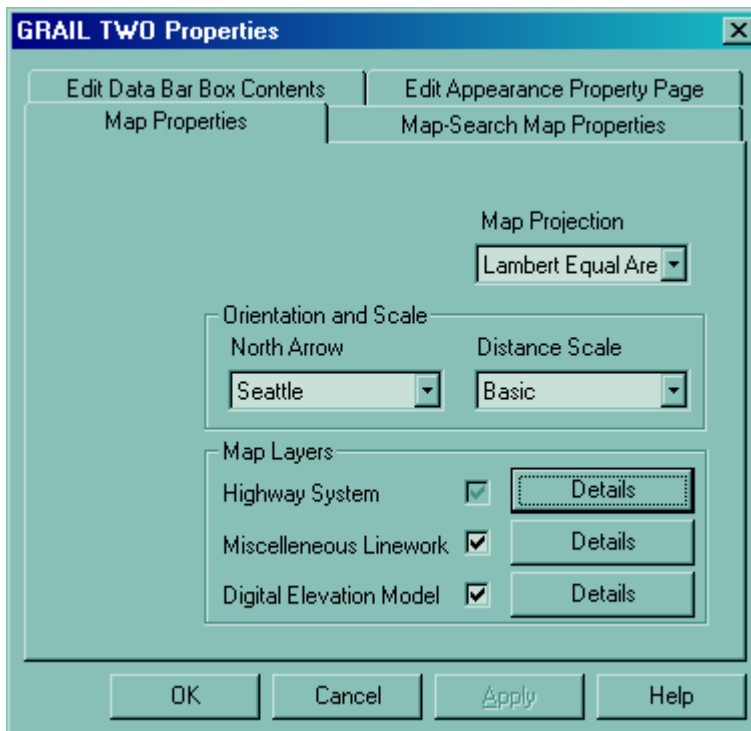
This allows the user to select precisely how far along a route to place the “hot point” or cursor. This dialog accomplishes a similar function as just clicking on the map (which moves the hot point to the closest point on the active highway to where the user clicks). The dialog just gives the user the ability to choose the location of the hot point by mileage instead of graphically. This function is typically invoked by clicking on the text to the immediate right of the mileage slider tool in the data bar box; the text that says something like “Values for MP 5.329 on 001580”.

The Date Selection Dialog:



This dialog is used to select the date that will be used in the data querying. The default is the current date. The user should be warned that changing this date will result in a re-load of all the data that is currently viewed by the data bar box.

The Map Properties Dialog:



The Map Properties Dialog is the main interface for modifying the appearance of the map that typically occupies the top third of the GRAIL application window. It has controls for various aspects of the map.

The Map Search Properties Dialog:

The screenshot shows a software dialog box titled "GRAIL TWO Properties". It has two tabs: "Map Properties" (selected) and "Map-Search Map Properties". The "Map Properties" tab contains settings for map orientation and scale. The "Map Projection" is set to "Lambert Equal Area". The "Orientation and Scale" section includes a "North Arrow" set to "Seattle" and a "Distance Scale" set to "Basic". The "Map Layers" section has three items: "Highway System" (checked), "Miscellaneous Linework" (checked), and "Digital Elevation Model" (unchecked). Each checked item has a "Details" button next to it. At the bottom are "OK", "Cancel", "Apply", and "Help" buttons.

GRAIL TWO Properties	
Edit Data Bar Box Contents	Edit Appearance Property Page
Map Properties	Map-Search Map Properties
Map Projection Lambert Equal Area	
Orientation and Scale	
North Arrow Seattle	Distance Scale Basic
Map Layers	
Highway System <input checked="" type="checkbox"/>	Details
Miscellaneous Linework <input checked="" type="checkbox"/>	Details
Digital Elevation Model <input type="checkbox"/>	Details
OK	Cancel
Apply	Help

The Edit Data Bar Box Contents Dialog:

The screenshot shows a Windows-style dialog box titled "GRAIL TWO Properties". It has a tabbed interface with four tabs: "Map Properties", "Map-Search Map Properties", "Edit Data Bar Box Contents" (which is the active tab), and "Edit Appearance Property Page".

Below the tabs, there is a text instruction: "This list describes the contents of the data bar box. Use the buttons to change the contents as desired; re-order the bars by dragging them into position. Note that the number of bars is limited only by viewing".

A table lists the current contents of the data bar box:

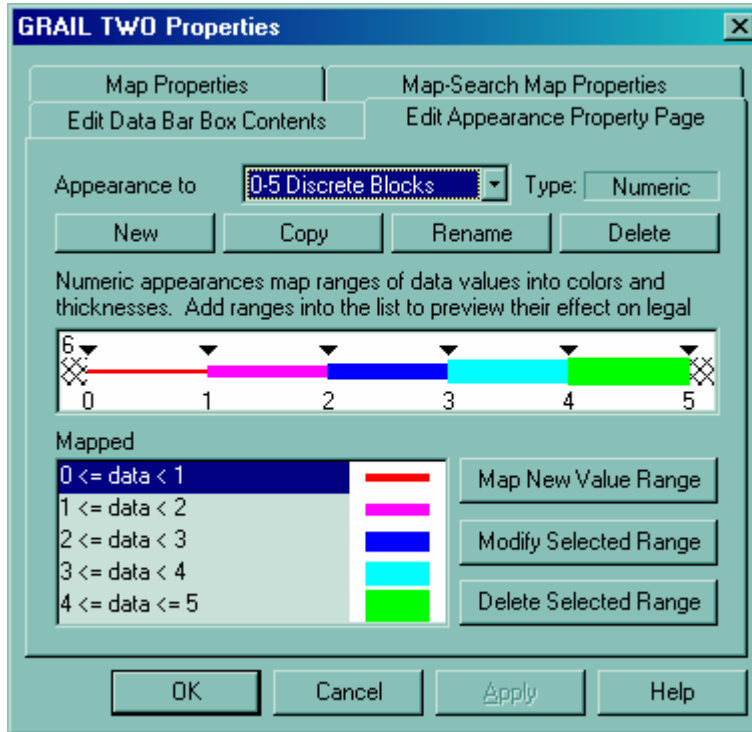
Label	Source Name	Appearance Name
Number of Lanes	BAD Number of Lanes	0-5 Red-Green Fade
Cracking 1	Cracking Index	0-5 Red-Green Fade
Roughness 2	Roughness Index	0-5 Red-Green Fade
Roughness 3	Roughness Index	0-5 Discrete Blocks
Route Type 1	Route Type	Route Type
Milepost Log 1	Milepost Log	MPLog
Rutting	Rutting	0-5 Red-Green Fade

Below the table are four buttons arranged in a 2x2 grid:

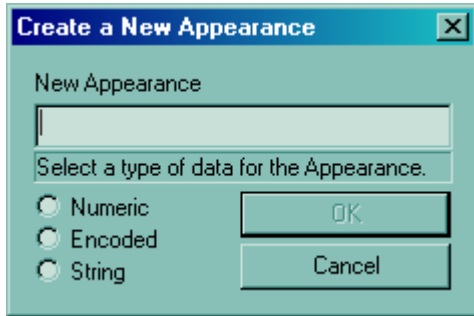
- Top-left: "Add a new data bar" (with a dashed border)
- Top-right: "Add a copy of the selected bar"
- Bottom-left: "Modify the selected bar"
- Bottom-right: "Remove the selected bar"

At the bottom of the dialog are four standard buttons: "OK", "Cancel", "Apply", and "Help".

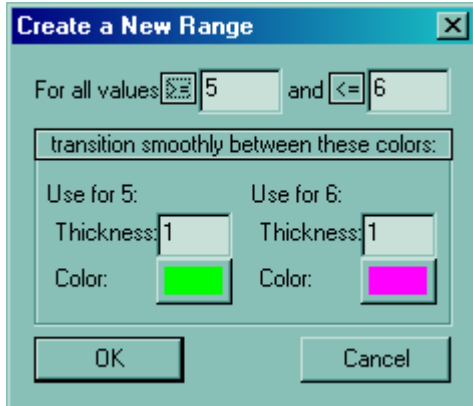
The Edit Appearance Property Page Dialog:



The Create A New Appearance Dialog:



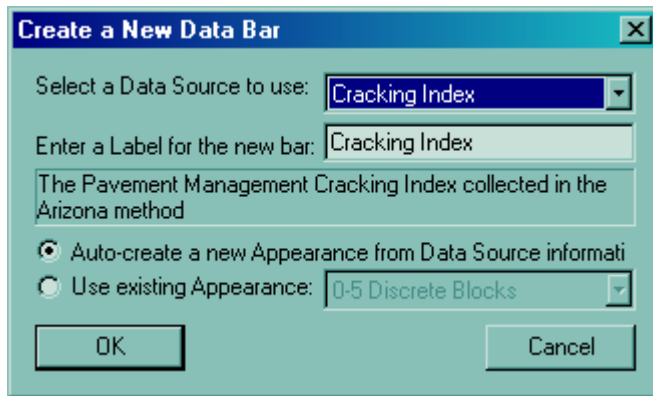
The Create a New Appearance Range Dialog:



The dialog box is titled "Create a New Range" with a close button (X) in the top right corner. It contains the following elements:

- A label "For all values" followed by a range selector icon, a text box containing "5", the word "and", another range selector icon, and a text box containing "6".
- A label "transition smoothly between these colors:" above a horizontal line.
- Two columns of settings:
 - Use for 5:**
 - Thickness: 1
 - Color: A green color swatch.
 - Use for 6:**
 - Thickness: 1
 - Color: A magenta color swatch.
- At the bottom, two buttons: "OK" and "Cancel".

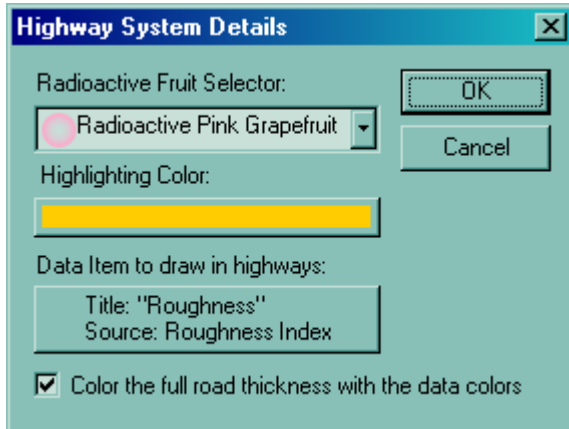
The Create a New Data Bar Dialog:



The image shows a Windows-style dialog box titled "Create a New Data Bar". It has a standard close button (X) in the top right corner. The dialog contains the following elements:

- A label "Select a Data Source to use:" followed by a dropdown menu showing "Cracking Index".
- A label "Enter a Label for the new bar:" followed by a text input field containing "Cracking Index".
- A text area containing the text "The Pavement Management Cracking Index collected in the Arizona method".
- Two radio buttons for appearance selection:
 - The first radio button is selected and is followed by the text "Auto-create a new Appearance from Data Source informati".
 - The second radio button is unselected and is followed by the text "Use existing Appearance:" and a dropdown menu showing "0-5 Discrete Blocks".
- At the bottom, there are two buttons: "OK" on the left and "Cancel" on the right.

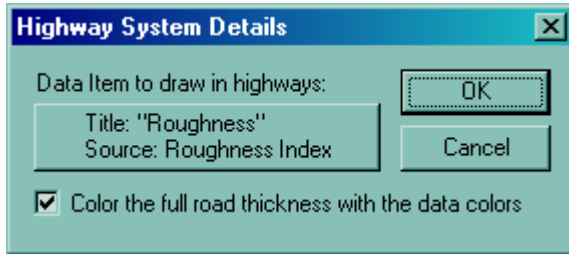
The Highway System Map Layer Details Dialog (for the Map Search Map):



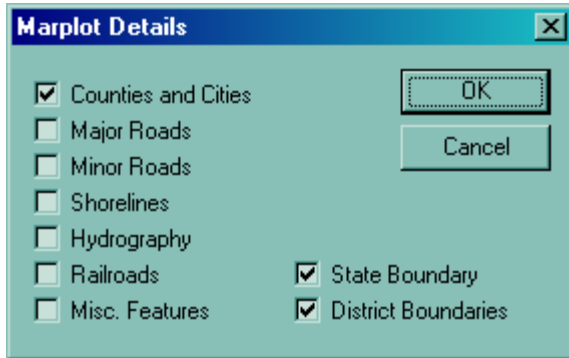
The image shows a dialog box titled "Highway System Details" with a close button (X) in the top right corner. The dialog has a light blue background and contains the following elements:

- Radioactive Fruit Selector:** A dropdown menu showing "Radioactive Pink Grapefruit" with a small downward arrow on the right.
- Highlighting Color:** A color selection box displaying a yellow color.
- Data Item to draw in highways:** A text box containing the text "Title: 'Roughness'" and "Source: Roughness Index".
- Checkboxes:** A checked checkbox labeled "Color the full road thickness with the data colors".
- Buttons:** "OK" and "Cancel" buttons are located on the right side of the dialog.

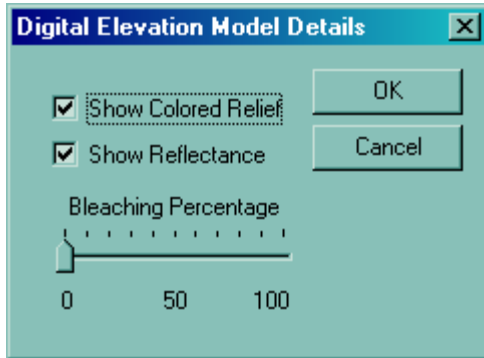
The Highway System Map Layer Details Dialog (for the Regular Map):



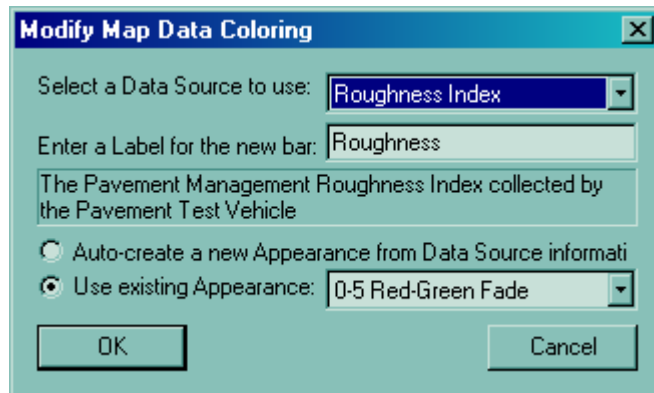
The Marplot (Miscellaneous Linework) Map Layer Details Dialog:



The Digital Elevations Map Layer Details Dialog:



The Data Coloring to show on the map Dialog:



The image shows a screenshot of a software dialog box titled "Modify Map Data Coloring". The dialog has a light blue header bar with the title and a close button (X). The main area is white and contains the following elements:

- A label "Select a Data Source to use:" followed by a dropdown menu showing "Roughness Index".
- A label "Enter a Label for the new bar:" followed by a text input field containing "Roughness".
- A text box containing the description: "The Pavement Management Roughness Index collected by the Pavement Test Vehicle".
- Two radio buttons for appearance selection:
 - The first radio button is unselected and labeled "Auto-create a new Appearance from Data Source informati".
 - The second radio button is selected and labeled "Use existing Appearance:". It is followed by a dropdown menu showing "0-5 Red-Green Fade".
- At the bottom, there are two buttons: "OK" on the left and "Cancel" on the right.

CHAPTER 8

Technicalities

THE DATA SPECIFICATION FILE (dataspec.txt)

As mentioned in Chapter 3, the data specification file (hereafter referred to as the dataspec file) is the place where information as to where GRAIL looks for highway attribute data is kept. Each main entry in the dataspec file corresponds to a potential data bar in the data bar box and must have at least the following basic information:

Where the data can found
How to read the data once it's found
What dates the aforementioned information applies
Its data type (number, string, or enumerated)

The basic structure of each entry of the dataspec file is as follows:

```
<Name of Data Bar>
{
    Desc: Descriptive text for the data item

    Data Type: STRING, NUMBER, or ENUM
    Values:    (If type is ENUM)
    {
        "Value 1"
        "Value 2"
        ...
        "Value n"
    }

    For Dates: MM/DD/YYYY thru MM/DD/YYYY (or "all")
    {
        Reader: Reader Type
        (Stuff that pertains to the given reader)
        String Values: (If type is ENUM, one-to-one with "Values:" above)
        {
            "String Value 1"
            "String Value 2"
            ...
            "String Value n"
        }
    }
    For Dates: MM/DD/YYYY thru MM/DD/YYYY (next batch of dates)
    {
        same info as above for these dates
    }
}
```

```
}  
For Dates: ...  
}
```